International Journal of Medical, Pharmacy and Drug Research (IJMPD)
[Vol-6, Issue-2, Mar-Apr, 2022]
ISSN: 2456-8015
https://dx.doi.org/10.22161/ijmpd.6.2.4

Peer-Reviewed Journal

Drug Utilization Patterns of Anti Hypertensive agents in patients undergoing Hemodialysis in a Tertiary Care Hospital

Sravan.P, Sridevi.P*, Anantha Lakshmi.G, Bindu.P, Saamiya Mehnaaz, Dharani Sathya, Syeda Uzma Nishath, Soma Sekhar.M, Bhagavan Raju. M

Sri Venkateshwara college of Pharmacy, Madhapur, Hyderabad-500081
Corresponding Author: sripingali25@gmail.com

Received: 05 Feb 2022; Received in revised form: 06 Mar 2022; Accepted: 11 Mar 2022; Available online: 20 Mar 2022

Abstract— *Background: India is experiencing a rapid health transition and is projected to become a major reservoir of chronic diseases like Diabetes and Hypertension and 25 to 40% of these subjects may develop chronic kidney disease and end stage renal disease. Aim and objective of the study was to analyze utilization pattern of antihypertensive drugs in chronic kidney disease patients in a tertiary care hospital. Methods: The present observational cross-sectional study was conducted in Apollo hospitals, Jubilee hills, Hyderabad from 01.12.2019 to 31.05.2020 on patients with chronic kidney disease stage 5. The drug utilization pattern was studied with respect to age, sex, basic disease, duration of dialysis, type of antihypertensives used, etc. Comparison of mean between gender and dialysis / not on dialysis was done using unpaired 't' test. A p value of < 0.05 was taken as statistically significant. Results: Of 100 patients, the data was analyzed with respect to age categories between 18-30 years; 31-40; 41-50; 51-60; 61-70; >70 years which accounted for 10%, 11%, 20%, 35%, 21% and 3% respectively. The patients between age group between 51-60 years were more prevalent compared to other age groups, based on gender distribution, majority of sample size were found to be males (62%) followed by females (38%). In our study sample, few subjects were found to be Overweight and obese subjects accounted for 33% and 20% respectively followed by subjects with normal BMI 44% and Underweight 3%.Almost all the subjects had Comorbidities. The profound ones were Dyslipidemia, Diabetes mellitus, Hypothyroid, CAD. The contribution of hypertension to medical morbidity and mortality is therefore enormous as it has been shown in other studies with stroke, anemia, Type 2 DM, and renal failure. It is the most common associated comorbid condition among many medical admissions. Most clinicians are often guided by their preference for any of the major guidelines available for the management of hypertension. Previously, diuretics were considered to be the first-line drugs. However, guidelines by the JNC VII recommend both CCBs as well as ACE-I as first-line drugs in addition to diuretics. Conclusions: In order to treat CKD, it is important to treat hypertension as hypertension and CKD are related to each other. Treatment of hypertension will help in controlling future development of comorbidities. Calcium channel blockers and centrally acting drugs are the treatment of choice in patients with CKD stage 5D with hypertension. Multi-drug antihypertensive therapy is a better choice than mono/single-drug antihypertensive therapy.*

Keywords— Drug Utilization Patterns, Hypertension, high blood pressure, Angiotensin receptor blockers.

I. INTRODUCTION

Drug utilization study is defined as "the marketing, distribution, prescription and utilization of drugs in the society with special emphasis on the resulting medical, social and economic consequences" and has the main aim

of facilitating the rational use of drugs, which is very important in decision making for healthcare.

Hypertension: Hypertension (HTN or HT), also known as high blood pressure (HBP), is a long-term medical condition in which the blood pressure in the arteries is persistently elevated. Long-term blood pressure however is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral arterial disease, vision loss, chronic kidney disease, and dementia.

Haemodialysis:

Haemodialysis is a process of purifying the blood of a person whose kidneys are not working normally. This type of dialysis achieves the extracorporeal removal of waste products such as creatinine and urea and free water from the blood when the kidneys are in a state of kidney failure. Haemodialysis is one of three renal replacement therapies (the other two being kidney transplant and peritoneal dialysis). It can be outpatient or inpatient therapy.

In patients with end-stage disease (ESRD) treated with haemodialysis or peritoneal dialysis, hypertension is common and often poorly controlled. Hypertension is present in more than 90% of patients at the initiation of haemodialysis and persists in more than two-thirds, despite the use of several antihypertensive medications. Hypertension in CKD increases the risk of important adverse outcomes, including loss of kidney failure, early development, and accelerated progression of cardiovascular (CVD) and premature death.

Antihypertensives in haemodialysis patients:

Hypertension affects most hemodialysis patients and is often poorly controlled. Adequate control of BP is difficult with conventional hemodialysis alone but is important to improve cardiovascular outcomes. Non-pharmacological interventions to improve BP include educating patients about limiting sodium intake, ensuring adequate sodium solute removal during hemodialysis, and achieving target “dry weight”. However, most patients require several antihypertensive medications to achieve an appropriate BP. First-line antihypertensive agents include ACE inhibitors (Angiotensin converting enzyme inhibitors) and ARB’s (Angiotensin receptor blockers) given their safety profile and demonstrated benefit on cardiovascular disease or congestive heart failure and may improve outcomes in these populations. Calcium channel blockers and direct vasodilators are also effective for controlling BP. Many blood pressure gents can be dosed once daily and should preferentially be administered at night to control nocturnal blood pressure and minimize intradialytic hypotension. In patients who are non-compliant with therapy, renally eliminated agents (such as lisinopril and atenolol) can be given thrice weekly following haemodialysis. Older antihypertensive agents which require thrice daily dosing ought to be avoided given the high pill burden with these regimens and he concern for noncompliance resulting in rebound hypertension. Newer antihypertensive agents, such as direct rennin inhibitors, may provide alternative options to improve BP but require testing for efficacy and safety in haemodialysis patients.

II. STUDY METHODOLOGY

Study Design**:**

1. Reference Standard: International recommendations i.e., AHA/JNC VII guidelines
2. Study design: Prospective study.
3. Study duration: 6 months.
4. Sample size: 100.

Selection of Subjects:

Inclusion criteria:

1. All patients who are above 18 years of age and are undergoing hemodialysis.
2. All hemodialysis patients with comorbidities and receiving antihypertensive drugs.
3. Hemodynamically stable patients on dialysis.
4. In patients and out patients.

Exclusion criteria:

1. Patients who are below 18 years of age.
2. Non hypertensive patients on hemodialysis.
3. Pregnant women.
4. ICU patients.

Study Site: Dialysis Unit, Apollo Hospitals, Hyderabad.

Study procedure:

Data collection form was designed to collect the demographics of the patients from patient charts. The data was analyzed, reported and compared with that of the institutional guidelines for appropriateness of the treatment.

Statistical analysis:

Data was analyzed by Microsoft excel and statistical software. Data was summarized by mean ± standard deviation (SD) for continuous data and percentages for categorical data.

Data Handling and Management

- Data collection form will be enclosed.

- MS Excel format will be used for interpretation of collected data.
- Patients will be assigned a specific case number along with their initials, and only this will be used while collecting relevant information.
- The confidentiality of the patient, consultant and the institution name will be strictly ensured.
- Strict privacy and confidentiality will be maintained during data collection.

III. RESULTS

Table1: Age Based Distribution

Age(yrs)	No. Of subjects	percentage of subjects
18-30	10	10%
31-40	11	11%
41-50	20	20%
51-60	35	35%
61-70	21	21%
71-86	3	3%

Table:2: Gender Distribution of Study Population

Gender	No. Of subjects	Percentage of subjects
Female	38	38%
Male	62	62%
TOTAL	100	100%

Table-3: BMI (Kg/M²) Based Distribution Of Cases

BMI (kg/m²)		NUMBER OF CASES (%)
Underweight	<18.5	3
Normal	18.5-24.9	44
Overweight	25-29.9	33
Obese	>30	20

Table 4: Comorbidities Based Distribution

Comorbidity	DM2	Hypothyroidsm	CAD	Hypothyroidsm+ DM2	Others
No. of patients	**21**	**10**	**17**	**3**	**21**

Table 5: Hypertensive Classes

Hypertensive Classes	**No. of patients**	Percentage
CCB	93	49
Beta Blockers	46	24
Alpha blockers	23	12
ARB	4	2
Centrally Acting	19	10
Potassium channel blockers	3	2
Vasodilators	3	2

Table 6: Drug Interactions in Study Population

Drug interactions	**No of subjects**	**Percentage of subjects**
Yes	57	57%
No	43	43%
Total	100	100%

Table 7: Combination therapies

Combination therapy	**No of patients**	**Percentage**
Single drug	31	31%
Two drugs	39	39%
Three drugs	21	21%
Four drugs	8	8%
Five drugs	1	1%

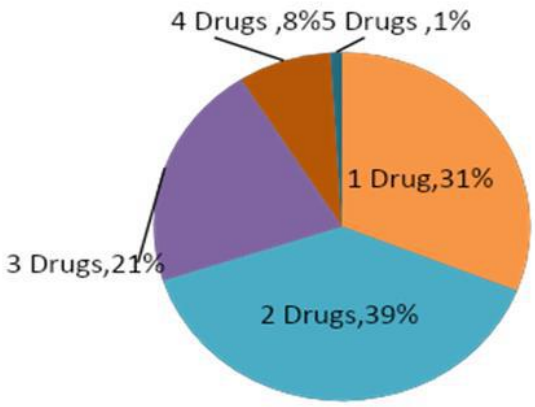

Fig.1: Combination Therapies

Table 8: Different Types Combination Therapies

One drug	
Drugs	No of patients
CCB's's	18
β Blockers	6
α_2 agonist	6
Two drug combinations	
CCB's's + β Blockers	17
CCB's's + α 2 agonist	10
β Blockers + α_2 agonist	6
CCB's + α blocker	2
α blocker + α_2 agonist	1
β blocker + α blocker	1
CCB's + Vasodilator	1
α_2 agonist + k^+channel	1
Three drug combinations	
CCB's + α 2 agonist + β Blockers	8
CCB's + α_2 agonist + α blocker	6
CCB's + ARB's + β Blocker	2
CCB's + k +channel + Vasodilator	1
CCB's + α blocker + β Blockers	2
CCB's + α blocker + Vasodilator	1
CCB's + β Blockers + k + channel blocker	1
Four drug combinations	
CCB's + α_2 agonist + α blocker + β Blockers	3
CCB's + α_2 agonist + α blocker + Vasodilator	2
CCB's + CCB's + α blocker + Vasodilator	1
CCB's + α_2 agonist + β Blockers + Vasodilator	1
β Blockers+ α_2 agonist+α blocker + vasodilator	1
Five drug combinations	
β Blockers + CCB's + α blocker + α_2 agonist + Vasodilator	1
	100

Table 9: Comparison of Different Drug Classes Used in Below And Above 60 Years Of Age In Study Population

DRUG CLASS	< 60 YEARS	>60 YEARS
CCB's	34%	38%
BB's	23%	23%
CA	22%	15%
AB's	11%	13%
VD's	3%	11%
ARB's	3%	0%
Combinations	4%	0%

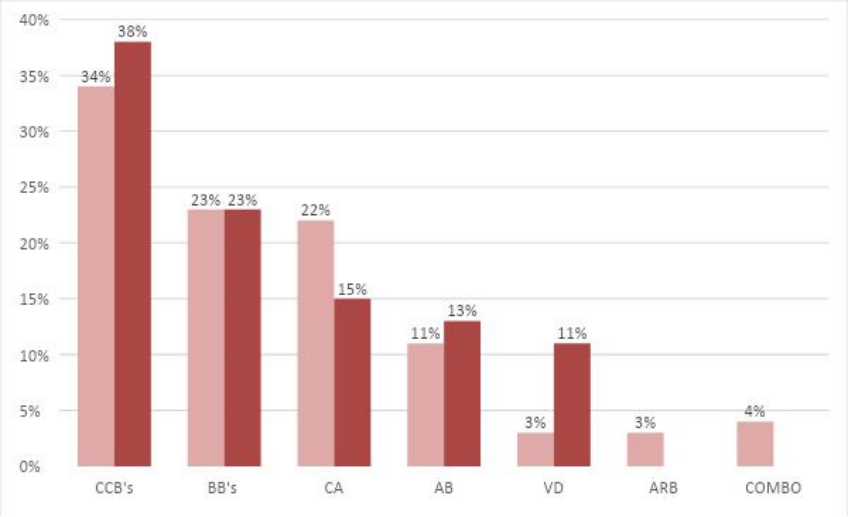

Fig.2: Comparison of Different Drug Classes Used In Below And Above 60 Years Of Age In Study Population

Table 10: Dose Appropriateness

DOSES	NO OF PATIENTS	PERCENTAGE
Appropriate	98	98%
Inappropriate	2	2%
Total	100	100%

IV. SIGNIFICANT FINDINGS

- In our study population - 56% were in the age group of 51-70.
- In total study population, 62% were males and 38% females.
- The most prescribed agents were in the order of CCBs 49% followed by BB 24% and α blockers 12%.
- In age group 18-40 & 51-86, cilnidipine was the most prescribed agent whereas in age group 41-50, cilnidipine & moxonidine were the most prescribed.
- 31% of the patients were on monotherapy, 39% on dual therapy and 21% on triple therapy
- The drug interactions found were 57% from the total population.

V. LIMITATIONS

- The study was done based on the data collected from the patient files, therefore adherence of the drugs was not assessed and home BP was not recorded.
- We could not monitor drug-drug interactions hence we forwarded the data to the chief clinical pharmacist in the unit.

VI. CONCLUSION

- Antihypertensive prescriptions in tertiary care hospital appear to follow appropriate internationally acceptable and relevant guidelines with minimal differences.
- The prescription pattern was majorly driven by the presence of long-term complications of hypertension during admission. The commonly prescribed drug

  classes were:

  CCB's > β – blockers > α 2 agonist
- In CKD, patients have other comorbidities which leads to polypharmacy hence

  clinical pharmacist can monitor the drug-drug interactions and optimize the therapy.

VII. FUTURE PROSPECTS

- The future prospects of the study would be to assess the medication adherence in the CKD patients.
- Patient counselling regarding the salt restriction, life style modifications, home BP monitoring should be done.
- Hypertension in dialysis patients poses almost unique diagnostic, prognostic and therapeutic challenges. Henceforth, the evolution of studies using home or ambulatory BP monitoring should be currently needed in order to better define the true burden of HTN in hemodialysis.

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